

Physics

PHOTON TRANSMISSION IN SCINTILLATING OPTICAL FIBERS FOR COSMIC RAY ASTROPHYSICS EXPERIMENTS

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Scintillating optical fibers are chemically treated long, narrow optical fibers that produce photons when traversed by charged particles. The photons are transmitted to an end of the fiber where they are read out by the photoelectric effect. Layers of flat planes of such fibers running parallel to each other can be used as a detector to determine the path of a charged particle through space. This is important in a number of applications. For example, in astrophysics, scintillating fibers are planned for mounting in balloon and satellite space-based experiments, where they will be used to help determine the relative abundances of the nuclei of chemical elements in cosmic rays.

With narrow high-resolution scintillating fibers, only a handful of photons are produced. It is thus important to be able to distinguish signals for successive integer numbers of photoelectrons from each other. In this talk I will explain how we are able to achieve this using hybrid Silicon-photomultiplier technology and show some of our results.